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94

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Tyr Gln Ile Lys Val Arg Val Asp Met Val Glu Leu Lys Arg Lys Met
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Arg Asn His Glu Val Tyr Glu Gln His Lys Ile Thr Ser Tyr Gln Ala
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50 Val Leu Gln Ala Arg Leu Thr Val Ser Gly Leu Lys Ala Arg Ala Lys  
 20 25 30

55 Lys Asp Glu Leu Gln Ile Lys Val Arg Val Asp Met Val Glu Leu Lys  
 35 40 45

Arg Lys Met Met Tyr Met Arg Arg Arg His Arg Gln Asp Ala Leu Ala

98

	50		55		60
5	Arg Val Tyr Glu Ile Lys Cys Arg Cys Pro Ser Gln Glu Pro Met Ser	65	70	75	80
10	Ile Tyr Val Tyr Phe Glu Gln Pro Thr Glu Thr Pro Pro Tyr Ala Tyr	85	90		95
15	Ile Tyr Thr Thr Tyr Leu Gln Glu Phe Phe Trp Asp Ala Asn Asp Ile	100	105		110
20	Tyr Tyr Glu Gln His Lys Ile Thr Ser Tyr Gln Glu Pro Met Ser Ile	115	120	125	
25	Tyr Val Tyr Ser Glu His Pro Thr Phe Thr Ser Gln Tyr Gln Ala Ile	130	135	140	
30	Arg Glu Thr Val Glu Leu Val Thr Glu His Asp Thr Leu Leu Tyr Asn	145	150	155	160
35	Leu Val Pro Met Val Ala Thr Val Val Leu Glu Glu Thr Ser Val Met	165	170		175
40	Leu Arg Ile Phe Ala Glu Leu Glu Gly Val Ile Ile Tyr Thr Arg Asn	180	185		190
45	His Glu Val Ile Met Arg Glu Phe Asn Ser Tyr Lys Ala Tyr Ala Gln	195	200	205	
50	Lys Ile Phe Lys Ile Leu Gln Tyr Asp Pro Val Ala Ala Leu Phe Tyr	210	215	220	
55	Val Lys Tyr Val Tyr Glu Ser Phe Asp Ile Tyr Arg Ile Phe Ala Glu	225	230	235	240
	Leu				
	<210>	313			
	<211>	241			
	<212>	PRT			



<213> synthetic polypeptide

5 <400> 313

Cys Pro Ser Gln Glu Pro Met Ser Ile Tyr Val Tyr Phe Glu Gln Pro  
 1 5 10 15

10 Thr Glu Thr Pro Pro Tyr Ala Tyr Ile Tyr Thr Thr Tyr Leu Gln Glu  
 20 25 30

15 Phe Phe Trp Asp Ala Asn Asp Ile Tyr Tyr Glu Gln His Lys Ile Thr  
 35 40 45

20 Ser Tyr Gln Glu Pro Met Ser Ile Tyr Val Tyr Ser Glu His Pro Thr  
 50 55 60

25 Phe Thr Ser Gln Tyr Val Thr Glu His Asp Thr Leu Leu Tyr Asn Leu  
 65 70 75 80

Val Pro Met Val Ala Thr Val Val Leu Glu Glu Thr Ser Val Met Leu  
 85 90 95

30 Arg Ile Phe Ala Glu Leu Glu Gly Val Ile Ile Tyr Thr Arg Asn His  
 100 105 110

35 Glu Val Ile Met Arg Glu Phe Asn Ser Tyr Lys Asn Val Arg Arg Ser  
 115 120 125

40 Trp Glu Glu Leu Lys Ala Arg Asp His Leu Ala Val Leu Gln Ala Arg  
 130 135 140

45 Leu Thr Val Ser Gly Leu Lys Ala Arg Ala Lys Lys Asp Glu Leu Gln  
 145 150 155 160

Ile Lys Val Arg Val Asp Met Val Glu Leu Lys Arg Lys Met Met Tyr  
 165 170 175

50 Met Arg Arg Arg His Arg Gln Asp Ala Leu Ala Arg Val Tyr Glu Ile  
 180 185 190

55 Lys Cys Arg Ala Tyr Ala Gln Lys Ile Phe Lys Ile Leu Gln Tyr Asp  
 195 200 205

100

Pro Val Ala Ala Leu Phe Tyr Val Lys Tyr Val Tyr Glu Ser Phe Asp  
 210 215 220

5 Ile Tyr Arg Ile Phe Ala Glu Leu Gln Ala Ile Arg Glu Thr Val Glu  
 225 230 235 240

10 Leu

<210> 314  
 15 <211> 241  
 <212> PRT  
 20 <213> synthetic polyepitope peptide

<400> 314  
 25 Ala Tyr Ala Gln Lys Ile Phe Lys Ile Leu Asn Leu Val Pro Met Val  
 1 5 10 15

30 Ala Thr Val Asn Val Arg Arg Ser Trp Glu Glu Leu Glu Leu Lys Arg  
 20 25 30

35 Lys Met Met Tyr Met Val Thr Glu His Asp Thr Leu Leu Tyr Phe Glu  
 35 40 45

40 Gln Pro Thr Glu Thr Pro Pro Ala Arg Val Tyr Glu Ile Lys Cys Arg  
 50 55 60

Arg Ile Phe Ala Glu Leu Glu Gly Val Val Leu Glu Glu Thr Ser Val  
 65 70 75 80

45 Met Leu Cys Pro Ser Gln Glu Pro Met Ser Ile Tyr Val Tyr Ile Ile  
 85 90 95

50 Tyr Thr Arg Asn His Glu Val Arg Arg Arg His Arg Gln Asp Ala Leu  
 100 105 110

55 Ile Met Arg Glu Phe Asn Ser Tyr Lys Gln Ile Lys Val Arg Val Asp  
 115 120 125

101

Met Val Tyr Glu Gln His Lys Ile Thr Ser Tyr Gln Tyr Asp Pro Val  
 130 135 140

5 Ala Ala Leu Phe Ser Glu His Pro Thr Phe Thr Ser Gln Tyr Gln Glu  
 145 150 155 160

10 Phe Phe Trp Asp Ala Asn Asp Ile Tyr Tyr Val Lys Tyr Val Tyr Glu  
 165 170 175

15 Ser Phe Asp Ile Tyr Arg Ile Phe Ala Glu Leu Lys Ala Arg Asp His  
 180 185 190

Leu Ala Val Leu Gln Ala Arg Leu Thr Val Ser Gly Leu Lys Ala Arg  
 195 200 205

20 Ala Lys Lys Asp Glu Leu Tyr Ala Tyr Ile Tyr Thr Thr Tyr Leu Gln  
 210 215 220

25 Glu Pro Met Ser Ile Tyr Val Tyr Gln Ala Ile Arg Glu Thr Val Glu  
 225 230 235 240

30 Leu

<210> 315

35 <211> 241

<212> PRT

<213> synthetic polyepitope peptide

40

<400> 315

45 Tyr Glu Gln His Lys Ile Thr Ser Tyr Gln Glu Pro Met Ser Ile Tyr  
 1 5 10 15

50 Val Tyr Glu Leu Lys Arg Lys Met Met Tyr Met Arg Arg Arg His Arg  
 20 25 30

Gln Asp Ala Leu Ala Arg Val Tyr Glu Ile Lys Cys Arg Ala Tyr Ala  
 35 40 45

55 Gln Lys Ile Phe Lys Ile Leu Gln Tyr Asp Pro Val Ala Ala Leu Phe

102

	50		55		60
5	Tyr Val Lys Tyr Val Tyr Glu Ser Phe Asp Ile Tyr Arg Ile Phe Ala	65	70	75	80
10	Glu Leu Ser Glu His Pro Thr Phe Thr Ser Gln Tyr Gln Ala Ile Arg	85	90	95	
15	Glu Thr Val Glu Leu Asn Val Arg Arg Ser Trp Glu Glu Leu Lys Ala	100	105	110	
20	Arg Ala Lys Lys Asp Glu Leu Val Thr Glu His Asp Thr Leu Leu Tyr	115	120	125	
25	Asn Leu Val Pro Met Val Ala Thr Val Val Leu Glu Glu Thr Ser Val	130	135	140	
30	Met Leu Arg Ile Phe Ala Glu Leu Glu Gly Val Ile Ile Tyr Thr Arg	145	150	155	160
35	Asn His Glu Val Ile Met Arg Glu Phe Asn Ser Tyr Lys Gln Ile Lys	165	170	175	
40	Val Arg Val Asp Met Val Phe Glu Gln Pro Thr Glu Thr Pro Pro Tyr	180	185	190	
45	Ala Tyr Ile Tyr Thr Thr Tyr Leu Gln Glu Phe Phe Trp Asp Ala Asn	195	200	205	
50	Asp Ile Tyr Lys Ala Arg Asp His Leu Ala Val Leu Gln Ala Arg Leu	210	215	220	
55	Thr Val Ser Gly Leu Cys Pro Ser Gln Glu Pro Met Ser Ile Tyr Val	225	230	235	240
	Tyr				
	<210>	316			
	<211>	241			
	<212>	PRT			

103

&lt;213&gt; synthetic polypeptide

5 <400> 316

Gln Ile Lys Val Arg Val Asp Met Val Ala Arg Val Tyr Glu Ile Lys  
 1 5 10 15

10 Cys Arg Asn Leu Val Pro Met Val Ala Thr Val Tyr Val Lys Tyr Val  
 20 25 30

15 Tyr Glu Ser Phe Arg Ile Phe Ala Glu Leu Glu Gly Val Tyr Ala Tyr  
 35 40 45

20 Ile Tyr Thr Thr Tyr Leu Ile Ile Tyr Thr Arg Asn His Glu Val Ile  
 50 55 60

25 Met Arg Glu Phe Asn Ser Tyr Lys Ser Glu His Pro Thr Phe Thr Ser  
 65 70 75 80

Gln Tyr Ala Tyr Ala Gln Lys Ile Phe Lys Ile Leu Gln Tyr Asp Pro  
 85 90 95

30 Val Ala Ala Leu Phe Asp Ile Tyr Arg Ile Phe Ala Glu Leu Gln Glu  
 100 105 110

35 Phe Phe Trp Asp Ala Asn Asp Ile Tyr Asn Val Arg Arg Ser Trp Glu  
 115 120 125

40 Glu Leu Lys Ala Arg Asp His Leu Ala Val Leu Val Leu Glu Glu Thr  
 130 135 140

45 Ser Val Met Leu Gln Ala Arg Leu Thr Val Ser Gly Leu Lys Ala Arg  
 145 150 155 160

Ala Lys Lys Asp Glu Leu Glu Leu Lys Arg Lys Met Met Tyr Met Val  
 165 170 175

50 Thr Glu His Asp Thr Leu Leu Tyr Gln Glu Pro Met Ser Ile Tyr Val  
 180 185 190

55 Tyr Arg Arg Arg His Arg Gln Asp Ala Leu Cys Pro Ser Gln Glu Pro  
 195 200 205

104

Met Ser Ile Tyr Val Tyr Phe Glu Gln Pro Thr Glu Thr Pro Pro Tyr  
 210 215 220

5

Glu Gln His Lys Ile Thr Ser Tyr Gln Ala Ile Arg Glu Thr Val Glu  
 225 230 235 240

10 Leu

<210> 317

15 <211> 241

<212> PRT

20 <213> synthetic polypeptide

<400> 317

25

Asp Ile Tyr Arg Ile Phe Ala Glu Leu Cys Pro Ser Gln Glu Pro Met  
 1 5 10 15

30 Ser Ile Tyr Val Tyr Gln Ala Ile Arg Glu Thr Val Glu Leu Lys Ala

20 25 30

35 Arg Asp His Leu Ala Val Leu Asn Leu Val Pro Met Val Ala Thr Val

35 35 40 45

Tyr Val Lys Tyr Val Tyr Glu Ser Phe Val Leu Glu Glu Thr Ser Val  
 50 55 60

40

Met Leu Asn Val Arg Arg Ser Trp Glu Glu Leu Ile Met Arg Glu Phe  
 65 70 75 80

45

Asn Ser Tyr Lys Ala Tyr Ala Gln Lys Ile Phe Lys Ile Leu Glu Leu  
 85 90 95

50 Lys Arg Lys Met Met Tyr Met Gln Tyr Asp Pro Val Ala Ala Leu Phe

100 105 110

Ser Glu His Pro Thr Phe Thr Ser Gln Tyr Gln Ala Arg Leu Thr Val  
 115 120 125

55

105

Ser Gly Leu Lys Ala Arg Ala Lys Lys Asp Glu Leu Gln Ile Lys Val  
 130 135 140

5 Arg Val Asp Met Val Arg Arg Arg His Arg Gln Asp Ala Leu Ala Arg  
 145 150 155 160

10 Val Tyr Glu Ile Lys Cys Arg Phe Glu Gln Pro Thr Glu Thr Pro Pro  
 165 170 175

Tyr Ala Tyr Ile Tyr Thr Thr Tyr Leu Gln Glu Phe Phe Trp Asp Ala  
 180 185 190

15 Asn Asp Ile Tyr Tyr Glu Gln His Lys Ile Thr Ser Tyr Val Thr Glu  
 195 200 205

20 His Asp Thr Leu Leu Tyr Gln Glu Pro Met Ser Ile Tyr Val Tyr Arg  
 210 215 220

25 Ile Phe Ala Glu Leu Glu Gly Val Ile Ile Tyr Thr Arg Asn His Glu  
 225 230 235 240

30 Val

<210> 318

35 <211> 241

<212> PRT

40 <213> synthetic polypeptide peptide

<400> 318

45 Asn Leu Val Pro Met Val Ala Thr Val Gln Ala Arg Leu Thr Val Ser  
 1 5 10 15

50 Gly Leu Val Thr Glu His Asp Thr Leu Leu Tyr Tyr Ala Tyr Ile Tyr  
 20 25 30

Thr Thr Tyr Leu Gln Glu Phe Phe Trp Asp Ala Asn Asp Ile Tyr Val  
 35 40 45

55 Leu Glu Glu Thr Ser Val Met Leu Glu Leu Lys Arg Lys Met Met Tyr

106

	50	55	60
5	Met Arg Ile Phe Ala Glu Leu Glu Gly Val Gln Glu Pro Met Ser Ile 65 70 75 80		
10	Tyr Val Tyr Ile Ile Tyr Thr Arg Asn His Glu Val Ile Met Arg Glu 85 90 95		
15	Phe Asn Ser Tyr Lys Arg Arg Arg His Arg Gln Asp Ala Leu Ala Tyr 100 105 110		
20	Ala Gln Lys Ile Phe Lys Ile Leu Ser Glu His Pro Thr Phe Thr Ser 115 120 125		
25	Gln Tyr Gln Tyr Asp Pro Val Ala Ala Leu Phe Tyr Val Lys Tyr Val 130 135 140		
30	Tyr Glu Ser Phe Asp Ile Tyr Arg Ile Phe Ala Glu Leu Asn Val Arg 145 150 155 160		
35	Arg Ser Trp Glu Glu Leu Lys Ala Arg Ala Lys Lys Asp Glu Leu Ala 165 170 175		
40	Arg Val Tyr Glu Ile Lys Cys Arg Cys Pro Ser Gln Glu Pro Met Ser 180 185 190		
45	Ile Tyr Val Tyr Phe Glu Gln Pro Thr Glu Thr Pro Pro Gln Ile Lys 195 200 205		
50	Val Arg Val Asp Met Val Tyr Glu Gln His Lys Ile Thr Ser Tyr Gln 210 215 220		
55	Ala Ile Arg Glu Thr Val Glu Leu Lys Ala Arg Asp His Leu Ala Val 225 230 235 240		
60	Leu		



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU02/00829

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
Int. Cl. <sup>7</sup> : C07K 14/045; A61K 39/12, 39/295; A61P 31/12; C12N 15/00		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) STN, Medline, CA, WPIDS, BIOSIS (keywords: polyepitop?, epitop?, cytomegalovirus, CMV, HCMV, cytotoxic T lymphocytes, CTL.)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Journal of Clinical Microbiology, Vol. 32, No. 2, Feb. 1994; Ripalti, A. et al, "Construction of Polyepitopes Fusion Antigens of Human Cytomegalovirus of ppUL32: Reactivity with Human Antibodies", pp. 358-363  See abstract and "materials and methods"	107-112, 142, 147
A	Microbiologica, Vol. 18, 1995; Ripalti, A. et al, "Construction of a polyepitope fusion antigen of Human Cytomegalovirus ppUL32 and detection of specific antibodies by ELISA", pp. 1-12.  See summary and "materials and methods"	107-112, 142, 147
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex		
<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>		
Date of the actual completion of the international search 17 October 2002		Date of mailing of the international search report 25 OCT 2002
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929		Authorized officer  GAVIN THOMPSON Telephone No : (02) 6283 2240

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU02/00829

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	The Journal of Infectious Diseases, Vol. 181, 2000; Gyulai, Z. et al, "Cytotoxic T Lymphocyte (CTL) Responses to Human Cytomegalovirus pp65, IE1-Exon4, gB, pp150, and pp28 in Healthy Individuals: Reevaluation of Prevalence of IE1-Specific CTLs", pp. 1537-46  See abstract	107-112, 142, 147
A	Journal of Clinical Microbiology, Vol. 37, No. 1, Jan. 1999; Greijer, A. et al, "Molecular Fine-Specificity Analysis of Antibody Responses to Human Cytomegalovirus and Design of Novel Synthetic-Peptide-Based Serodiagnostic Assays", pp.179-188  See abstract and Table 1.	107-112, 142, 147
A	WO 94/23744 A (THE WISTAR INSTITUTE OF ANATOMY AND BIOLOGY and THE GOVERNMENT OF THE UNITED STATES OF AMERICA on behalf of THE DEPARTMENT OF HEALTH AND HUMAN SERVICES) 27 October 1994  See abstract	107-112, 142, 147
A	WO 98/21233 A (CITY OF HOPE) 22 May 1998  See abstract	107-112, 142, 147
A	WO 01/72782 A (CITY OF HOPE) 4 October 2001  See abstract	107-112, 142, 147

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU02/00829

**Box I** Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos :  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☒ Claims Nos : 1 to 106, 113 to 141, 143 to 146, 148 to 270  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:  
So many peptide sequences are claimed - at least 318 - that a search that is more than 3 to 4 per cent of this total is economically prohibitive.
  
3. ☐ Claims Nos :  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

**Box II** Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See attached sheets (as per attachment to "INVITATION TO PAY ADD. FEES").

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention mentioned in the claims as agreed; it is covered by claims Nos.:

107-112, 142, 147

**Remark on Protest**

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/AU02/00829**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
WO 94/23744		CA	2160583	US	5552143	AT	140154
		CA	2012895	DE	69627695	DK	389286
		EP	389286	ES	2091221	GR	3020765
		US	5591439	WO	94/17810		
WO 98/21233		US	6074645	US	6156317	US	6251399
		AU	74814/98	CA	2308118	EP	1023319
		JP	2001519181	WO	99/19349	WO	01/72782
		AU	49243/01	EP	946592		
WO 01/72782		AU	49243/01	US	6251399	EP	946592
		WO	98/21233				
END OF ANNEX							